

REMARKS:

The Office Action dated July 25, 2006, has been carefully considered. In response thereto, the present paper, which is believed to be fully responsive to that Office Action, has been prepared. The following includes a summary of the Office Action and Applicants' arguments in favor of patentability.

Status of the Claims and Summary of the Office Action

Claims 1-31 are pending in the application. Claim 17 was listed twice (the first instance being a partial recitation of the claim). The first listed claim 17 is being cancelled. No new claims are being added. Thus, upon entry of this paper in the record, claims 1-31 will be pending.

As indicated in the Office Action, claims 25-31 have been allowed. Claims 1-6, 8-18, and 20-24 have been rejected under 35 U.S.C. § 101 and under 35 U.S.C. § 112, second paragraph. Claims 17 and 17 have been rejected under 35 U.S.C. § 112, second paragraph. Claims 7 and 19 are objected to as being dependent on a rejected base claim, but would be allowable if rewritten in independent form.

Applicants appreciate that the Examiner has indicated that claims 7, 19, and 25-31 are allowable or are conditionally allowable.

The following remarks are intended to address each of the Examiner's rejections.

Rejections of Claims Under 35 U.S.C. § 101

As noted above, claims 1-6, 8-18, and 20-24 have been rejected under 35 U.S.C. § 101 as not being directed to patentable subject matter. According to the Examiner, the claimed "communicating" step of the invention is not recited as being a specific "useful, concrete and tangible result."

Applicants respectfully submit that the amended claims are directed to statutory subject matter under § 101 because they recite, *inter alia*, "a communications subsystem for communicating the [probability of precipitation] values via at least one communications channel" (see amended independent claims 1 and 13). The term "communications channel"

refers to, as defined in the specification, “wired, wireless and hardcopy channels such as a web page or e-mail on the Internet, a pager, telephony (voice and/or data), broadcast, printed page, and personal data organizer, each of which may include a voice-activated interface.” Thus, having a communications subsystem that outputs a probability of precipitation value that other can use is a “real physical world interactive end result” of the claimed computation method that can positively be used in a practical “useful, concrete and tangible” real world manner. Accordingly, reconsideration and withdrawal of the rejection of claims 1-6, 8-18, and 20-24 under § 101 are requested.

Rejections of Claims 17 and 17 Under 35 U.S.C. § 112, Second Paragraph

Claims 17 and 17 have been rejected under 35 U.S.C. § 112, second paragraph, because they have the same claim number. The first listed claim 17 has been cancelled. Withdrawal of the rejection of claims 17 and 17 under § 112, second paragraph, is requested.

Rejections of Claims 1-6, 8-18, and 20-24 Under 35 U.S.C. § 112, Second Paragraph

Claims 1-6, 8-18, and 20-24 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that the applicant regards as the invention. In particular, the Examiner questions the “communicating values” feature recited in the independent claims 1 and 13 (from which claims 2-6, 8-18, and 20-24, depend).

Applicants have amended claims 1 and 13 to change “values” to “value” to be consistent with the rest of the claimed features that recite only a single value being calculated. Also, Applicants respectfully submit that the amendments made to the claims to address the § 101 rejections also address the Examiner’s concerns with regard to § 112, second paragraph.

Reconsideration and withdrawal of the rejection of the claims under § 103(a) are requested.

Allowed Claims

Applicants appreciate that the Examiner has indicated that claims 25-31 are allowable. Applicants reserve the right to submit comments regarding the Examiner's stated reasons for allowance of those claims at a later time.

Information Disclosure Statement

With regard to the Examiner's comments on the previously submitted Information Disclosure Statement (IDS), Applicants will provide the references not considered by the Examiner if they cannot be located.

Help with FOUS data: Model Output Statistics

The following is an example of a NGM Fous/MOS output for Midway Airport. MOS, or model output statistics are not direct numerical output (the "other" fous data), but simply derived numbers from the model. For more information, please see your Graphical Guidance book where an entire section is devoted to MOS for many of the models.

MDW	C	NGM MOS GUIDANCE 11/18/96 1200 UTC																	
DAY/NOV	18	/NOV 20													/				
HOUR	18	21	00	03	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00
MN/MX							31				43				35				45
TEMP	40	42	38	36	34	32	32	36	41	42	40	39	38	37	37	38	42	43	41
DEWPT	22	22	23	24	24	24	24	27	27	29	29	30	32	31	31	31	32	33	32
CLDS	OV	BK	SC	BK	BK	SC	BK	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV
WDIR	28	28	30	30	31	32	30	22	20	36	06	08	08	06	03	06	08	08	10
WSPD	04	05	04	03	05	04	02	03	04	04	07	05	08	07	06	04	05	05	06
POP06		0		3		11		21		42		26		21		26		26	
POP12						13				48				32				35	
QPF		0/		0/		0/0		0/		1/1		0/		0/1		0/		0/0	
TSV06		1/	4	2/	0	0/	3	0/	1	1/	0	1/	0	0/	0	2/	0	3/	0
TSV12				2/	2			0/	3			2/	0			1/	0		
PTYPE	R	R	R	R	R	S	S	R	R	R	R		R		R		R		R
POZP	4	1	3	6	8	8	8	3	3	3	5		1		3		1		4
POSN	45	38	35	44	38	45	48	45	38	37	38		45		31		13		18
SNOW		0/		0/		0/0		0/		0/0		0/		0/0		0/		0/0	
CIG	7	7	7	7	7	6	6	6	5	4	4		4		4				
VIS	5	5	5	5	5	5	5	5	5	4	4		4		5				
OBVIS	N	N	N	N	N	N	N	N	N	N	F		N		F				

MDW is the station ID. In this case, MDW is the id for Midway airport. Other local id's that have fous data are PIA, ORD, RFD, and MLI (Peoria, O' Hare, Rockford, and Moline respectfully)

Day is simply the day. /NOV 18/ means all the data below this is foecast for NOV 18th. Note that the dates correspond with UTC (Universal Time Coordinate) or Z (ZULU) time.

Hour is the hour that the forecast is valid. Knowing the day which is above it, you will then know when each parameter underneath it is valid for. Again, these times are "Z" time. They are in 3 hour increments for 60 hours

MN/MX is the Minimum or Maximum temperature that occured in the previous 12 hours up to that point. Basically, it's the forecast low's and hi's according to the NGM MOS.

TEMP is the temperature for that time.

DEWPT is the dewpoint for that time.

CLDS represents clouds. It will be one of the following..

- OV: Overcast (10/10 sky coverage)
- BK: Broken Skies (6/10 to 9/10 sky coverage)
- SC: Scattered Clouds (1/10 to 5/10 sky coverage)
- CL: Clear Skies (0/10 sky coverage)

Note: this is based on the old SAO standards, Not the METAR standards.

WDIR is the wind direction in degrees (0-350). Just add a zero to the end of the numnber and you will get your wind direction.

example: 28 would be 280 degrees, a west wind.

example: 03 would be 030 degrees, a north-northeast wind.

WSPD is the wind speed in knots

example: 14 would be 14 knots.

POP06 is the probability of precipitation for a 6 hour period ending at the specified time.

example: 68 = 68 percent chance of rain from 6 hours previous to this point.

POP12 is the probability of precip for a 12 hour period ending at the specified time.

example: 68 = 68 percent chance of rain from 12 hours previous to this point.

QPF is the quantitative precipitation forecast. The format is "6 hour total/12 hour total" up to the time specified. The numbers will value 0-5 for 6 hour totals and 0-6 for 12 hour totals of precipitation. The values for the 6 hour total are as follows:

- 0 = No precipitation
- 1 = 0.01 to 0.09"
- 2 = 0.10 to 0.24"
- 3 = 0.25 to 0.49"
- 4 = 0.50 to 0.99"
- 5 = > 1.00"

The values for 12 hour totals are as follows:

- 0 = No precipitation
- 1 = 0.01 to 0.09"
- 2 = 0.10 to 0.24"
- 3 = 0.25 to 0.49"
- 4 = 0.50 to 0.99"
- 5 = 1.00 to 1.99"
- 6 = > 2.00"

example: 2/ would be .10" to .24" for 6 hours while no 12 hour total was given.

example: 2/4 would mean .1" to .24" for the 6 hous up to the time specified and .5" to .99" for the 12 hours previous is forecast.

TSV06 is the thunderstorm/conditional severe thunderstorm potential for a 6 hour period ending at the time specified.

example: 56/65 suggests that there is a 56% chance of thunderstorms BUT it a 65% chance that if the thunderstorms do form, they will be severe.

TSV12 is the thunderstorm/conditional severe thunderstorm potential for a 12 hour period ending at the time specified.

example: 75/04 suggests that there is a 75% chance of thunderstorms and only a 4% chance that they will be severe.

PTYPE is the precipitation type. It is a forecast to say if there is precip, it will be in this form.

- s = snow
 - z = freezing rain/sleet
 - r = rain
-

POZP is the probability of frozen (sleet/freezing rain) precipitation, IF precip occurs.

example: 24 would mean that if there is precip, there is a 24% chance that it will be sleet/freezing rain.

POSN is the probability of snow, IF precipitation occurs.

example: 24 would mean that if there is precip, there is a 24% chance that it will be snow.

SNOW is the snow amount for 6/12 hour periods.

6 hour totals

- 0 = no snow
- 1 = trace to 2" of snow
- 2 = > 2" of snow

12 hour totals

- 0 = no snow
- 1 = trace to < 2" of snow
- 2 = 2 to < 4" of snow
- 4 = 4 to < 6" of snow
- 6 = > 6" of snow

example: 1/4 would mean that a trace to 2" of snow will fall in the 6 hours up to that point and 4 to 6" of snow for the 12 hours previous until the time specified.

CIG is the ceiling (lowest broken or overcast layer) height forecast.

- 1 = < 200 feet
 - 2 = 200-400 feet
 - 3 = 500-900 feet
 - 4 = 1000-3000 feet
 - 5 = 3100-6500 feet
 - 6 = 6600-12,000 feet
 - 7 = > 12,000 feet
-

VIS is the forecast visibility.

- 1 = < 1/2 mile
 - 2 = 1/2 to 7/8 miles
 - 3 = 1 to 2 3/4 miles
 - 4 = 3 to 5 miles
 - 5 = > 5 miles
-

OBVIS is the forecast for the type of obstruction to vision.

- H = Haze
 - F = Fog
 - N = No Haze or Fog
-

Forecasting Notes



The Nexlab Home Page

How to use E-Weather

When you receive an **Forecast E-Weather product** from SkyBit (email or fax) , the top of the form will look like the example below:

Subject: 'E-Weather Forecast ROCKS 980318'
 Date: Wed, 18 Mar 1998 07:16:01 -0500
 From: The AgMaster <agmaster@meso.com>
 To: cbackman@psu.edu

Copyright(c) 1998 SkyBit, Inc. Phone: (800) 454-2266

AgWeather Forecast for: PA-CENTRE COUNTY-ROCKSPRING
 Forecast beginning : WED Mar 18, 1998

Information is provided on the current date, where the form originated, who the email or fax is being sent to, and what the product is. Additional information is supplied giving the state, county and location of the site for which the product is being generated as well as the day the forecast begins.

The **0 - 48 Hour Forecast** portion looks like the sample below.

HOUR (EST)	<----- 0-48 HOUR FORECAST ----->													
	Mar 18							Mar 19						
	7a	10a	1p	4p	7p	10p	1a	4a	7a	10a	1p	4p	7p	10p
TEMP (F)	35	35	38	40	40	41	43	44	43	46	52	53	50	47
2"- SOIL TEMP (F)	37	39	41	42	41	39	37	44	45	48	51	53	52	49
REL HUM (%)	85	89	93	92	94	92	92	91	91	88	75	72	77	80
6HR PRECIP(in)	.17/		.16/		.09/		.50/		.51/		.03/		.00/	
6HR PRECIP PROB(%)	99/		81/		89/		92/		88/		43/		34/	
3HR WETNESS (hrs)	3	3	3	3	3	3	3	3	3	3	3	3	3	0
WIND DIR (pt)	SSE	SSE	SSE	S	SSE	SSE	SE	SE	S	S	WSW	WNW	NW	NNW
WIND SPEED (mph)	4	4	6	5	3	4	5	3	3	4	5	4	4	4
CLOUD COVER	OVC	OVC	OVC	OVC	OVC	OVC	OVC	OVC	OVC	OVC	OVC	OVC	OVC	OVC
3HR RADIATION (ly)	1	24	45	37	7	0	0	0	1	24	45	37	8	0
DRYING (key)	2	2	2	2	1	2	2	2	2	2	3	4	3	3
SPRAYING (key)	8	7	7	7	8	8	7	8	8	8	8	8	8	7

Mar 18							Mar 19						
7a	10a	1p	4p	7p	10p	1a	4a	7a	10a	1p	4p	7p	10p

Days are indicated across the top and the variable are presented in 3-hour intervals at the given hour.

TEMP (F)

Temperature at that hour in **degrees Fahrenheit**

2" - SOIL TEMP (F)

Soil temperature at a **2 inch depth** in **degrees Fahrenheit**

REL HUM (%)

Relative humidity at that hour given in **percent**

6-HR PRECIP (in)	Precipitation over a 6-hour period given in inches
6-HR PRECIP PROB (%)	Probability of precipitation over a 6 hour period given in percent
3HR WETNESS (hrs)	Hours of wetness over a 3-hour period in inches
WIND DIR (pt)	Wind direction in compass point
WIND SPEED (mph)	Wind speed in miles per hour
CLOUD COVER	Cloud cover as sky indications clr=clear, sct=scattered clouds, pcy=partly cloudy, ovc=overcast
3HR RADIATION (ly)	Radiation amount for a 3 hour period in langleys
DRYING (key)	0....1....2....3....4....5....6....7....8....9....10 Less favorable More favorable
SPRAYING (key)	0....1....2....3....4....5....6....7....8....9....10 Less favorable More favorable

*Note: drying and spraying indices assume no precipitation. Local precipitation will result in less favorable conditions.

The **1 - 7 Day Forecast** looks like the sample below:

	1-7 DAY FORECAST						
	Mar 18	Mar 19	Mar 20	Mar 21	Mar 22	Mar 23	Mar 24
	WED	THU	FRI	SAT	SUN	MON	TUE
MAX TEMP (F)	43	55	48	43	39	43	48
MIN TEMP (F)	35	42	39	33	25	22	23
PRECIP PROB (%)	100	100	85	70	30	27	30
AUG DAILY RH (%)	91	85	82	80	70	62	60
AUG WND SPD (mph)	4	4	4	11	11	10	8
DRYING (key)	2	3	3	4	5	5	5
SPRAYING (key)	8	8	8	3	4	4	5

MAX TEMP (F)	Daily maximum temperature in degrees Fahrenheit
MIN TEMP (F)	Daily minimum temperature in degrees Fahrenheit
PRECIP PROB (%)	Daily percent probability of precipitation
AUG DAILY RH (%)	Daily average relative humidity given in percent
AUG WND SPD (mph)	Daily average wind speed in miles per hour
DRYING (key)	0....1....2....3....4....5....6....7....8....9....10 Less favorable More favorable
SPRAYING (key)	0....1....2....3....4....5....6....7....8....9....10 Less favorable More favorable

*Note: drying and spraying indices assume no precipitation. Local precipitation will result in less favorable conditions.

The **8 - 10 Day Outlook** and the **30 and 90 Day Outlook** portion of the product looks like the sample below:

	<---- 8-10 DAY OUTLOOK ---->			<--30 AND 90 DAY OUTLOOK-->	
	Mar 25	Mar 26	Mar 27	ending	ending
	WED	THU	FRI	Apr 1	May 31
MAX TEMP (F)	49	49	50	N	N
MIN TEMP (F)	25	28	30	N	N
PRECIP PROB (%)	34	37	41	B	N
AUG DAILY RH (%)	63	66	67	B	N
AUG WND SPD (mph)	8	8	8		

MAX TEMP (F)

Daily maximum temperature in degrees Fahrenheit

MIN TEMP (F)

Daily minimum temperature in degrees Fahrenheit

PRECIP PROB (%)

Daily percent probability of precipitation

AVG DAILY RH (%)

Daily average relative humidity given in percent

AVG WND SPD (mph)

Daily average wind speed given in miles per hour

30 and 90 Day Outlook

A - Above Normal

B - Below Normal

N - Normal (compared to climatology)



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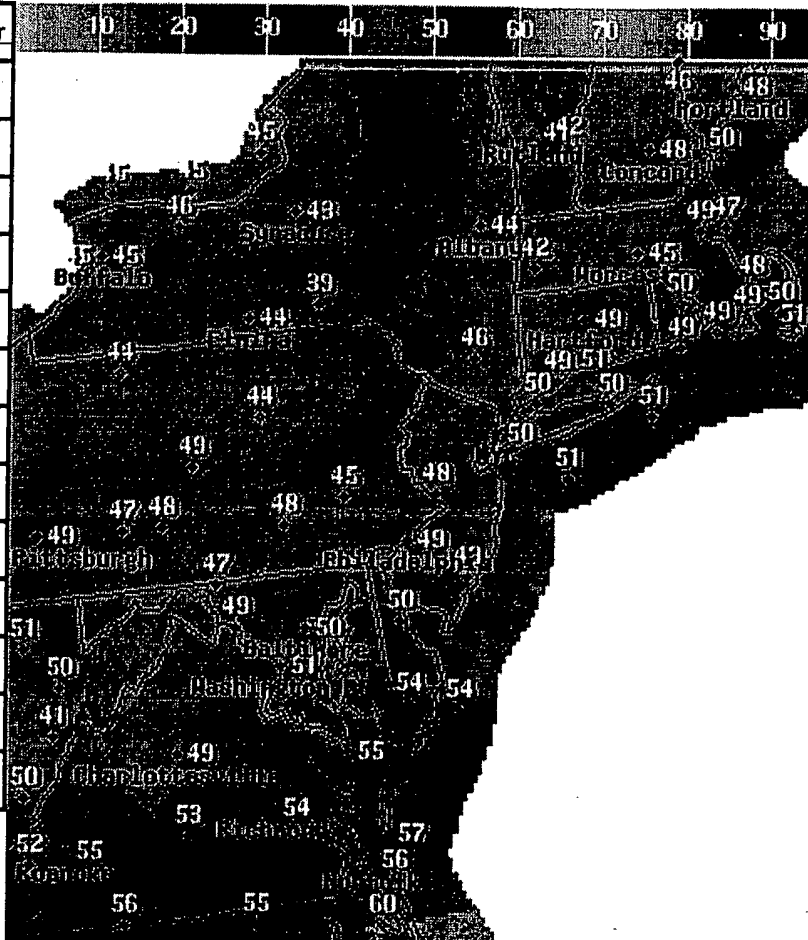
This map shows forecast temperatures for the US, normally updated every hour. This is an **experimental** product of the National Digital Forecast Database, produced by the National Weather Service. Public comments and suggestions are encouraged. The Weather Service will accept comments until December 1, 2003.

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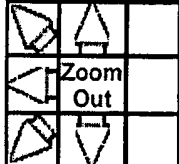
Experimental Graphical Forecasts Northeast Metro Area

Click on Map to Zoom In

Element Period	High / Low Temperature	Probability of Precipitation	Weather
Today	High	PoP12	12Z 18Z
Tonight	Low	PoP12	00Z 06Z
Thursday	High	PoP12	12Z 18Z
Thursday Night	Low	PoP12	00Z 06Z
Friday	High	PoP12	12Z 18Z
Friday Night	Low	PoP12	00Z 06Z
Saturday	High	PoP12	12Z 18Z
Saturday Night	Low	PoP12	00Z 06Z
Sunday	High	PoP12	12Z 18Z
Sunday Night	Low	PoP12	00Z 06Z
Monday	High	PoP12	12Z 18Z
Monday Night	Low	PoP12	00Z 06Z
Tuesday	High	PoP12	12Z 18Z



Adjacent Areas



Additional Elements



MaxT Forecast Ending Thu Nov 27 2003 00
(Wed Nov 26 2003 7PM EST)



National Digital Forecast Database

Experimental graphic created 11/26/2003 1:29PM EST



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Crec

Enhancing Weather Information with Probability Forecasts

(Adopted by AMS Council on 13 January 2002)
Bull. Amer. Met. Soc., **83**

Statement

Much of the informational content of meteorological data, models, techniques, and forecaster thought processes is not being conveyed to the users of weather forecasts. Making and disseminating forecasts in probabilistic terms would correct a major portion of this shortcoming. It would allow the user to make decisions based on quantified uncertainties with resulting economic and social benefits. Widespread implementation of probability forecasts would require forecasters to become more familiar with user needs, and users to be educated on probability forecasts and how to make optimum use of this new information. The American Meteorological Society endorses probability forecasts and recommends their use be substantially increased.

Background

Current situation Weather forecasts have improved dramatically over the past few decades and particularly in the last 20 years (*Bull. Amer. Meteor. Soc.*, **79**, 2161-2163). Forecasts produced by operational forecasters using the new observational data and results of improved numerical models have become more accurate at practically all time- and space scales for all weather elements. These forecasts are valuable in daily operations to users, including the general public, the military, aircraft operators, businesses, and emergency managers. These forecasts contribute very useful and often critical information for decision making.

However, there is much more information available than is being provided to users. Present-day forecasts are predominantly "categorical" in that the uncertainty inherent in the forecast is not made explicit. To make this information available would require that the uncertainty be quantified and put into understandable terms. This quantification would almost certainly involve numerical probabilities.

A probability forecast of a weather event can be a forecaster's judgement of the likelihood that the event will occur. Probability forecasts can also be produced directly from numerical models and postprocessing of model results, and climatological forecasts can be expressed in those terms. All these forecasts have the element of uncertainty, but such forecasts should be considerably more useful to a user than categorical forecasts, and perhaps critically so.

Some progress has been made, especially in recent years, in providing forecasts in probabilistic terms. Forecasts of probability of precipitation (PoP) have been made for over 30 years and are well accepted by a large clientele. More recently, probability forecasts are issued routinely by the National Centers for Environmental Prediction for a variety of weather phenomena, such as tropical cyclone "strike probabilities" and intensity; convective outlooks; heavy snow/icing outlooks; and 6-10 day, 8-14 day, monthly, and seasonal outlooks for temperature and precipitation. National Weather Service forecast offices and river forecast centers are beginning to produce probability forecasts of river stage, volume, and flow. However, these probability forecasts are still only a small fraction of all forecasts issued.

Effective use of probability forecasts requires that users understand them. The probability of an event is a familiar concept. For instance, what is the probability a die roll will be a 6; what is the probability Dasher will win the race; what is the probability I will win the lottery tomorrow? Though the exact value of the probability may not be known, the concept is familiar and understandable. A misunderstanding that is often encountered regards the definition of the

event. For example, for a forecast of 30% PoP for Boston tomorrow, a person may be unsure as to whether that means it will rain over 30% of the Boston area tomorrow, it will rain for 30% of the time tomorrow somewhere in Boston, there is a 30% probability it will rain somewhere in Boston tomorrow, or some other interpretation. Widespread use of probability forecasts will require significant efforts to educate the user in the definition of the event being forecast.

Opportunities An operational forecaster is provided considerable guidance for making probability forecasts. The statistical postprocessing of the output of dynamic weather prediction models can and does provide well-calibrated (reliable) probability estimates. The maturing technology of ensemble forecasts can also provide, with minimal postprocessing, probability estimates of specific weather events, such as precipitation amount for a given interval of time at a specific place being over, say, 0.25 inches; some forecasts of this nature are now being made available. Such "objective" forecasts are statistical estimates of the conditional relative frequency of the event. The relative frequency of a die roll producing a 6 is known to be one-sixth, under the assumptions of a fair die and a fair roll, but if we did not know this or suspected a loaded die, we could determine the probability of a 6 for that specific die by repeated rolls. This calculated relative frequency would be an estimate of the probability of the event, and in this case, a very good estimate, provided the number of rolls was large. Numerical weather models and their postprocessing do not yet produce as good an estimate for weather events, but they do provide useful results up to a week in advance, and are continually improving. With appropriate statistical processing, the objective probability forecasts will blend into climatological relative frequencies at the long range, which are also useful to some users.

Probability forecasts offer several benefits over categorical forecasts. They contain more information, because the uncertainty in the forecast is specifically expressed; the user is made aware of that uncertainty and can use that information in decision making. Probability forecasts can be used with thresholds to make decisions, where the thresholds can vary from user to user and purpose to purpose. Availability of probability forecasts would allow users to make the go/no?go decision based on quantitative uncertainties and his/her own threshold for making the decision. For instance, a school superintendent in a hilly area might cancel school with a lower probability of 2 inches or more of snow than one in a flat area where the journey to school in snowy conditions would be less dangerous.

Too often, the roles of the forecaster and the decision maker are confused, or blended into the forecast itself. Specific probability forecasts allow the roles to be separate, as they should be. A probability of 10 percent that flood waters will overtop a levee may influence one merchant to move stock to higher ground, but another, possibly because of the high cost of moving, may not move stock until the probability is 20 percent. Given only a categorical forecast (e.g., the crest will be 6 inches below the levee top), the user may choose to ignore it, to form his/her own probability of the overtopping to occur, or to base the operational decision on other information, but does not have the opportunity to use the full extent of information available. Entire municipalities may be lulled into inaction when there is in reality a significant chance that the town is in danger.

Probability forecasts would have significant economic benefits for the nation. Because a significant portion of the economy is weather sensitive, a new economic sector of weather risk management has come into being. This management industry provides a "hedging tool," allowing companies to even out their weather sensitive costs. Better management by these companies benefits the general public in the form of lower cost for commodities, such as power. Since this is a growing industry, the increase of probability forecasts at this time is especially appropriate.

Challenges A number of challenges arise with the use of probability forecasts. The examples cited above deal with single specific events; however, many forecast decisions are complex. For instance, for quantitative precipitation, one would like a probability distribution such that a

probability of any desired amount, say 0.5 to 1.0 inches, could be obtained for any desired time interval. Forecasters will need to be educated to handle these complexities. New ways for displaying and communicating probabilistic information are needed. Users must be educated on how to make optimum use of this new information. Although the concept of probability should be known, the actual use of the information may be challenging. Forecasters need to be aware of the specific user's needs (e.g., emergency managers) and help to devise methods and models for the user to employ in formulating plans of action. Guidance forecasts of weather variables will become even more important and must be communicated in probabilistic terms to operational forecasters so that they can make the best possible forecasts. Care must be taken that these forecasts are well calibrated. For instance, ensemble forecasts generally do not span the full range of meteorological possibilities, and probabilities estimated as relative frequencies directly from them may be too sharp.

Summary In general, present day weather forecasts do not contain a quantification of the uncertainty that is inherent in them. Probability forecasts based on the forecaster's thought processes and/or available models and techniques would substantially benefit users of weather forecasts. Successful implementation and use of probability forecasts will require forecasters to understand user needs for this information and to be trained in how to best use the guidance produced by models to make probability forecasts. Similarly, users of weather information must be trained in how to best interpret and use this valuable resource - probability forecasts.

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